EXAMINER'S AMENDMENT

1. An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this Examiner's amendment was given in a telephone interview with Jeffrey B. Powers on 12/09/09. The application has been amended as follows:

In the claims:

15. (Currently Amended) ~~An algorithm~~ A method for centroid detection in an image, comprising:

a) acquiring an XxY size image represented by a variable pixel signal intensity;

b) compressing the XxY size image to an X/n x Y/m size image, where n, m equal any integers and X/n, Y/m are integer values;

c) determining a background intensity for any position in the compressed image and subtracting this background from the compressed image;

d) detecting a plurality of approximately positioned centroids in the background-subtracted compressed image;

e) iterating step (d) until approximate positions of a desired plurality of centroids are detected;

f) converting the approximate position of the desired plurality of centroids into more exact positions in the XxY size image,

whereby every centroid position in the image has been identified;

g) iterating step (f) until a desired level of more exact positions is determined; and

h) assigning a quality factor to each centroid in relation to a magnitude of positional change for each centroid in each iteration of step (g).

18. (Currently Amended) The ~~algorithm~~ method of claim 15 , comprising:

sorting the centroids determined from step (f) according to a predetermined configuration.

19. (Currently Amended) The ~~algorithm~~ method of claim 18, wherein the configuration is a geometric grid.

20. (Currently Amended) The ~~algorithm~~ method of claim 19, comprising a rectangular grid.

21. (Currently Amended) The ~~algorithm~~ method of claim 18, wherein the configuration is a ring.

22. (Currently Amended) The ~~algorithm~~ method of claim 18, wherein the configuration is a straight line.

23. (Currently Amended) The ~~algorithm~~ method of claim 18, comprising:

associating each determined centroid with a respective centroid image forming element.

24. (Currently Amended) The ~~algorithm~~ method of ~~any of claims~~ claim 15 ~~or 18-23~~, wherein compressing the XxY size image to an X/n x Y/m size image comprises:

a) averaging the signal for every pixel in an n x m square starting in a first predetermined region of the original image and scanning through the image, setting a signal level in a corresponding first predetermined region of the compressed image to the average value of the first predetermined region;

b) repeating step (a) for a second and subsequent predetermined regions until the X/n x Y/m image size is obtained.

25. (Currently Amended) The ~~algorithm~~ method of claim 24, wherein n = m = 8.

26. (Currently Amended) The ~~algorithm~~ method of claim 24, wherein the first predetermined region is the upper left corner of the image.

27. (Currently Amended) The ~~algorithm~~ method of claim15, wherein step (c) comprises:

dividing the compressed image into a plurality of image segments each of which contains a plurality of centroids, determining an average signal value for each image segment, and extrapolating the average values for each image segment to determine the background intensity level.

28. (Currently Amended) The ~~algorithm~~ method of claim 27, wherein the image segments are squares.

29. (Currently Amended) The ~~algorithm~~ method of claim 27, wherein each image segment contains approximately 3 to 5 centroids.

30. (Currently Amended) The ~~algorithm~~ method of claim 15, wherein step (d) comprises:

a) determining a maximum signal value in the image;

b) setting a threshold value as a predetermined percentage of the maximum;

c) determining an X-position, a Y-position, and a signal strength of each pixel that has a signal strength greater than the threshold value;

d) sorting the values from step (c) in descending order of signal strength;

e) assigning the highest signal strength as first approximately positioned centroid; and

f) selecting a pre-set condition for defining all sorted values as approximately positioned centroids, which obey the pre-set condition.

31. (Currently Amended) The ~~algorithm~~ method of claim 30, wherein the pre-set condition is that the position of each subsequent approximately positioned centroid is a farther distance away than a pre-set distance from all yet determined approximately positioned centroids.

32. (Currently Amended) The ~~algorithm~~ method of claim 31, further comprising setting a new threshold value to a predetermined percentage of a minimum value of the sorted signal strengths and iterating steps (c-f), wherein the already identified approximately positioned centroids are not identified again.

33. (Currently Amended) The ~~algorithm~~ method of claim 15 , wherein step (f) comprises:

defining a boundary structure around every approximate position of the desired plurality of centroids in the original image; and

determining a center of mass of the signal for the signal distribution inside of the boundary.

34. (Currently Amended) The ~~algorithm~~ method of claim 20, comprising:

a) calculating a straight line formula for each sorted centroid, i, containing the centroid point, i, and having a slope between the values of about <-0.1 or >0.1;

b) calculating a distance, ni, between the line and a reference position in the image;

c) sorting all centroids, in, by ni starting with the smallest ni value;

d) assigning the centroid with the smallest ni to a first row and storing this centroid as a last centroid in the first row;

e) defining a region as an area to the right of a last centroid of a given row having dimensions that are variably controllable by an imaging component parameter and a shape suitable for detection of a selected grid structure;

f) obtaining the next ni value and determining, for all existing rows, whether the centroid is within the region;

g) assigning the centroid as the last centroid in the given row if the centroid is within the region, or, assigning the centroid as the last centroid in a new row if the centroid is outside the region;

h) repeating steps (f-g) for all centroids;

i) calculating an average y-position for each row and sorting the rows according to the average y-positions to identify a top row, Row 1, a next row, Row 2, and so on to Row n;

j) assigning the centroid with the smallest ni to a first column and storing this centroid as a last centroid in the first column;

k) defining a region as an area below the last centroid of a given column having dimensions that are variably controllable by the imaging component parameter and a shape suitable for detection of the selected grid structure;

l) obtaining the next ni value and determining, for all existing columns, whether the centroid is within the region;

m) assigning the centroid as the last centroid in the given column if the centroid is within the region, or, assigning the centroid as the last centroid in a new column if the centroid is outside the region;

n) repeating steps (l-m) for all centroids; and

o) calculating an average x-position for each column and sorting the columns according to the average x-positions to identify a first column, Column 1, a next column, Column 2, and so on to Column n.

35. (Currently Amended) The ~~algorithm~~ method of claim 34 wherein the reference position is an upper left corner of the image.

36. (Currently Amended) A device readable medium having stored thereon an executable instruction in the form of the ~~algorithm~~ method of claim 15.

REASONS FOR ALLOWANCE

2. Claims 15 and 18-36 are allowed. The following is a statement of the Examiner's reasons for allowance. Regarding claim 15, the prior art fails to disclose the step of assigning a quality factor to each centroid in relation to a magnitude of positional change for each centroid in each iteration of step (g). The claimed invention is therefore considered to be in condition for allowance as being novel and non-obvious over prior art.

3. The prior art taken either singly or in combination fails to anticipate or fairly suggest the limitations of the independent claims, in such a manner that a rejection under 35 USC 102 or 103 would be improper. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Other Information/Remarks

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JACK DINH whose telephone number is (571)272-2327. The examiner can normally be reached on M-F (9:30 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky L. Mack can be reached on 571-272-2333. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jack Dinh/
Examiner, Art Unit 2873
12/18/09

/William C. Choi/
Primary Examiner, Art Unit 2873
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